

Amdt. dated March 31, 2004

Reply to Office action of March 24, 2003

REMARKS/ARGUMENTS

Reconsideration of this case is respectfully requested. Filed concurrently herewith is a Petition For Revival of an Application for Patent Abandoned Unintentionally Under 37 CFR 1.137(b).

In order to reduce the number of issues for the Examiner's consideration of this case, claims 1-12 have been cancelled.

Independent claim 13 has been cancelled and re-written as new independent claim 28.

The invention relates to an improvement in machine tools which normally produce large quantities of cuttings or swarf. To ensure high quality cutting action, a cutting fluid is normally directed to the interface of the cutting tool and the workpiece to provide lubrication for the cutting action, and to wash cut material from machine surfaces in the region of the cutting tool. The flow of cutting fluid is normally continuous while the machine is in operation.

According to the invention, swarf is flushed from a machine tool by cutting fluid which flows across the surface of the machine only intermittently, typically for 3-5 seconds per minute. This allows less fluid to be used in flushing swarf from the machine surfaces. However, since the cutting fluid flows only intermittently, a higher per second flow rate may be utilized providing more complete and efficient flushing of swarf from the machine surfaces. The cutting fluid is collected, separated from the swarf, and recycled to be used repeatedly in cleaning swarf from the machine surfaces.

Using the invention, swarf may be more easily removed by the high volume flow

Amdt. dated March 31, 2004

Reply to Office action of March 24, 2003

of the fluid, and at the same time, the overall flow of fluid through the system is reduced. The time between flushings may vary between 30 seconds and two minutes, but preferably a flushing occurs every 60 seconds. When a flush does occur, it lasts between 2 and 7 seconds, and preferably between 3 and 5 seconds.

The amount of fluid which is used per flush varies from between 5 to 10 liters and the instantaneous flow rate varies from 100 to 300 liters per minute although fluid is only flowing for a few seconds. As a result, swarf is more easily removed by the high volume flow, and the volume of fluid through the system is reduced.

Since swarf accumulates at different parts of a machine tool at different rates, independent flow rates in timed intervals may be selected for various locations on the machine in order to most efficiently accomplish the swarf removal function.

No such device is shown by the prior art.

Claim Objections

Claim 16 is objected to on the basis that it is not clear how an outflow of fluid from the receptacle of claim 12/1 can be at a higher rate than the rate that fluid is provided to the receptacle.

This is possible because the receptacle receives fluid continuously but discharges fluid only intermittently. Thus, five liters of fluid may be delivered to the receptacle over one minute of time, and the five liters can be discharged from the outflow means over five seconds of time. As a result, the fluid delivered from the receptacle is at a higher rate than the delivery of fluid to the receptacle.

Claim 23 is objected to because it is not clear what "to deliver fluid to the or each

Amdt. dated March 31, 2004

Reply to Office action of March 24, 2003

receptacle" means.

This language has been changed to read "at least one of the receptacles." Thus, the meaning of the language should now be clear.

Claim Rejections 35 U.S.C. § 112

Claims 6, 11, 15 and 18 are rejected under 35 U.S.C. 112 as failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In all of these claims, the language of the claim recites a range of limitations which is inconsistent with a range of limitations recited in a claim on which the claim depends.

Claims 6 and 11 have been cancelled from this case, and as a result the rejection of these claims need not be considered further.

The dependency of claims 15 and 18 has been changed so that the claims are not dependent upon parent claims with inconsistent limitations.

Claim Rejections 35 U.S.C. § 102

Claims 1-3, 13 and 25 are rejected under 35 U.S.C. 102 (b) as being anticipated by Haninger, U.S. 6,210,085. This rejection is a respectfully traversed.

Claims 1-3 and 13 have been cancelled from this case, and the rejection with regard to these claims need not be considered further.

The system shown by Haninger is a typical machine tool cooling and swarf flushing system. There is no disclosure in Haninger patent that coolant flow is not continuous during machining, i.e., during the time the machine tool is generating swarf. In column 2, lines 4-6, 28, and 56, Haninger discloses that when the operator door is opened the flushing system may be shut down, that coolant is activated and then re-

Amdt. dated March 31, 2004

Reply to Office action of March 24, 2003

activated, and that intermittent cooling flooding occurs. However, these descriptions all relate to the shut off of coolant flow when the machine also stops. There is absolutely no disclosure or teaching in Haninger of turning the coolant flow on and off during machining in order to have an intermittent high fluid coolant flow rate to flush swarf intermittently, instead of continuously.

In order to properly reject a claim under 35 U.S.C. 102, the reference on which the rejection is based must show every feature of the claimed invention. As applied to claim 25, Haninger fails in this regard since Haninger does not show a swarf removal system for a machine tool in which swarf is removed from machine surfaces by fluid which flows only intermittently during the time that the machine tool is generating swarf. As a result, the rejection of claim 25 in this application under 35 U.S.C. 102 as anticipated by the reference to Haninger is improper, and should be withdrawn.

Claims 4 and 7 are rejected under 35 U.S.C. 103(a) as unpatentable over Haninger in view of Philips et al. (Philips)

Claims 4 and 7 have been cancelled from this case, and as a result, the rejection of these claims need not be considered further.

Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haninger in view of Philips and Bratten.

Claims 5 and 6 have been cancelled from this case, and as a result, the rejection of these claims need not be considered further.

Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haninger in view of Gerber.

Amdt. dated March 31, 2004

Reply to Office action of March 24, 2003

Claims 8-11 have been cancelled from this case, and as a result, the rejection of these claims need not be considered further.

Claims 12, 14, 15, 17-21, 23, 24, 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haninger in view of Bratten. This rejection is respectfully traversed.

As stated above, Haninger does not show a swarf removal system for a machine tool in which swarf is removed from machine surfaces by fluid which flows only intermittently during the time the machine tool is generating swarf. The patent to Bratten does not cure this deficiency of the Haninger reference. The patent to Bratten discloses a flush assist system for handling cutting fluid that is entrained with swarf. The system serves a plurality of machine tools 12 each having a sump 24. The sumps have a control valve 25 that drains into a common header pipe 28. The header pipe drains into a below floor tank 38, and a valve 40 controls flow from the header pipe through a down leg 36. The valve 40 is normally closed and is opened only when there is sufficient fluid in the down leg 36 to create a strong siphon action to draw the cutting fluid and the swarf into the tank 38. Cutting fluid is returned to the individual machine tools via a pipe 20 and a series of valves 22.

There is no indication at all in the Bratten disclosure that the valve 22 interrupts the flow of cutting fluid to one of the machine tools 12 when the machine tool 12 is in operation, i.e., when the machine is generating swarf. Typically, a valve such as 22 is used to cut off the flow of fluid to the machine tool when the machine is not being used. This allows some of the machines 12 to be used while others are idle without supplying

Amdt. dated March 31, 2004

Reply to Office action of March 24, 2003

cutting fluid to all of the machines.

As a result, the reference to Bratten completely fails to teach, show, or render obvious applicant's claimed limitation of a swarf removal system for a machine tool in which swarf is removed from machine surfaces by fluid which flows only intermittently during the time the machine tool is generating swarf. Claims 14, 15, 17-21, 23 and 24 all contain this limitation, and should thus be allowable.

Claims 26 and 27 recite a swarf management system comprising fluid flow from a receptacle for the removal of swarf and an outflow controller to cause fluid to flow from the receptacle only intermittently during the time the swarf is being generated. Such a swarf management system is neither shown, taught, or rendered obvious by the combined teachings of Haninger and Bratten, and thus a rejection of claims 26 and 27 as unpatentable under 35 U.S.C. 103 over Haninger in view of Bratten is untenable, and should be withdrawn.

Claim 22 is rejected under 35 U.S.C. 103(a) as unpatentable over Haninger in view of Bratten in view of Fachinger. This rejection is respectfully traversed.

The Examiner admits that Haninger does not teach a sump for separating cooling fluid and swarf. The Examiner uses the Fachinger reference to teach the use of a chip separator sump to separate chips from swarf. However, the use of a chip separator sump to separate chips from swarf is not in itself new. What is new is to use a chip separator sump to separate the chips from the swarf together with a swarf flushing system in which swarf is removed from machine surfaces intermittently during the time the machine tool is generating swarf. Haninger does not teach or show such an apparatus, Bratten does not

Amdt. dated March 31, 2004

Reply to Office action of March 24, 2003

teach or show such an apparatus, and Fachinger fails to cure this deficiency of the Haninger and Bratten references.

As a result, the rejection of claim 22 as unpatentable under 35 U.S.C. 103 over the references of Haninger in view of Bratten in view of Fachinger is believed to be untenable, and should be withdrawn.

For the foregoing reasons it is believed that this Amendment places the claims now appearing in this case in condition for allowance, and an early notice to such effect is respectfully solicited.

In the event that the Examiner does not agree that the claims are now in condition for allowance, he is courteously invited to contact the undersigned at the number given below in order to discuss any changes which the Examiner believes would lead to an allowance of the claims.

It is not believed that any new fees are necessitated by the entry of this amendment. However in the event that any new fees or charges are required, including Patent Application Extension Fees for filing this response after the period for response set

March 31, 2004

Amdt. dated March 31, 2004

Reply to Office action of March 24, 2003

in the Office Action of March 24, 2003, authorization is hereby given to charge such fees to applicant's Deposit Account No 50-0852. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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